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Agenda

- Health Hero Network Background
- Current Technology Solutions
- Contribution to MedKnowledgeMent
 - Information and Knowledge Acquisition →
The Feedback Loops
 - Contribution to Innovations
 - Linkage to Other Parts of Project
 - Patient Trials and Expected Outcomes

Health Hero Network Vision

- A better model of care is possible
- Crisis care → Coordinated care
- eHealth Networks and Technologies =
A Powerful Enabler

Health Hero Network

- Founded 1988 in Mountain View, California. Health Hero Network Ltd established 2003 in Dublin, Ireland.
- 25 employees, \$5 million annual sales, serving 30 provider sites and 2500 patients with daily in-home monitoring.
- Solution Partners signed in Ireland, France, Netherlands. Expecting to add Spain, Belgium, Norway in 2003.
- Licensees include Veterans Health Affairs, Mercy Health System, American Medical Alert, TheraSense, Philips.

eHealth Demonstration:

Veterans Health Affairs (US)

- Chronic care program using model of care based on eHealth Networks and Technologies from Health Hero Network
- 791 elderly high-risk patients with hypertension, heart failure, COPD, diabetes, enrolled for 1 year, compared to comparison group data
- Results (Disease Management, Volume 5, Number 2, 2002)
 - 63% reduction in hospital admissions
 - 60% reduction in hospital bed days
 - 40% reduction in emergency room visits
 - 64% reduction in nursing home admissions
 - 88% reduction in nursing home bed days
 - Significant improvement in Quality of Life

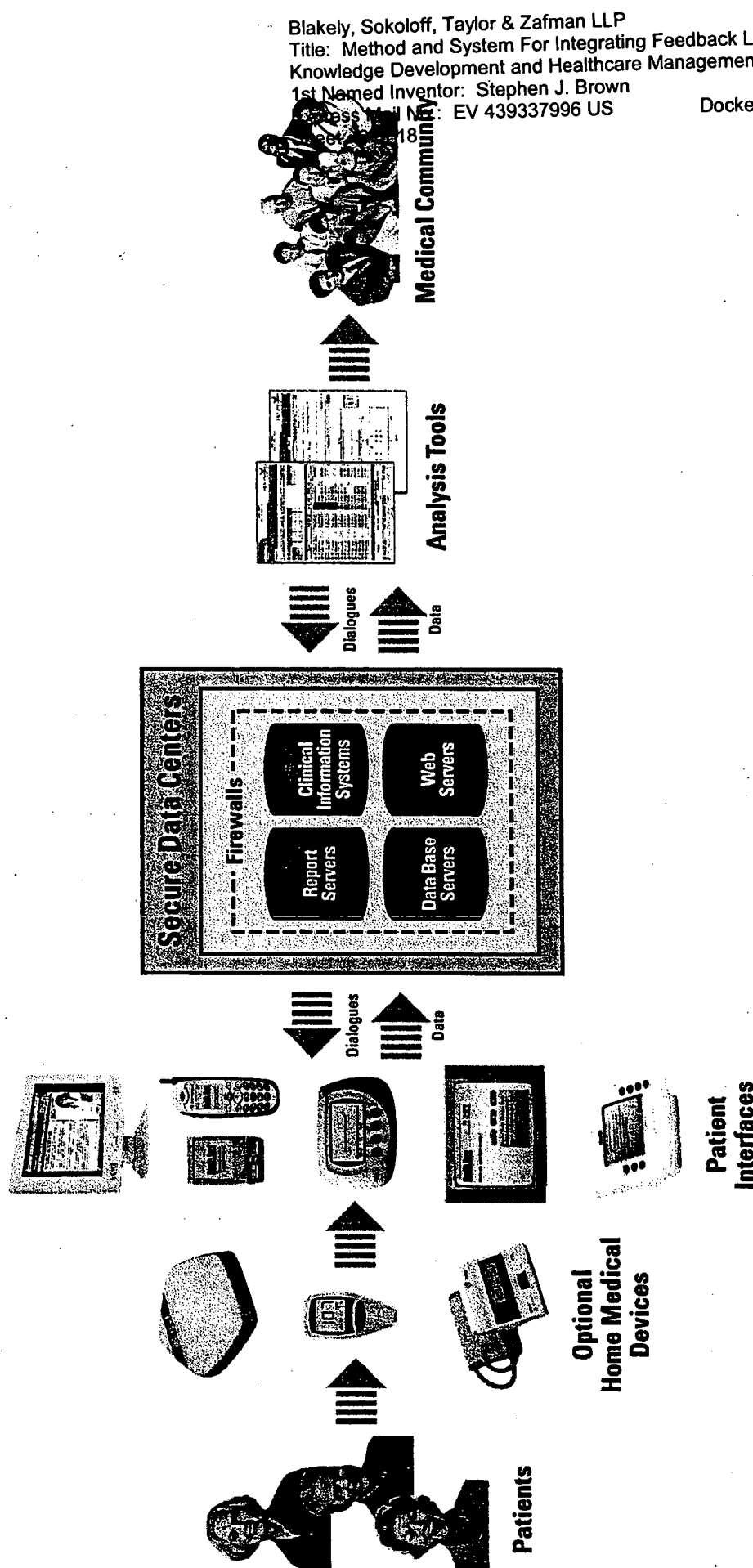
eHealth Demonstration:

Mercy Health System (US)

- Diabetes management program using eHealth Networks and Technologies from Health Hero Network
- 169 low income diabetes patients, one year study period using comparative cohort data from previous calendar year
- Results (Diabetes Technology & Therapeutics Journal, Dec 2002)
 - Outpatient visits reduced 49% ($p < 0.001$)
 - Inpatient admissions reduced 32% ($p < 0.07$)
 - ER encounters reduced 34% ($p < 0.06$)
 - Significant increase in quality of life scores
 - Medication compliance increased from 34% to 94%

Health Hero Network Platform

Vision: Open System for Chronic Care Research and Innovation, Any Device, Any Disease, Many Partners

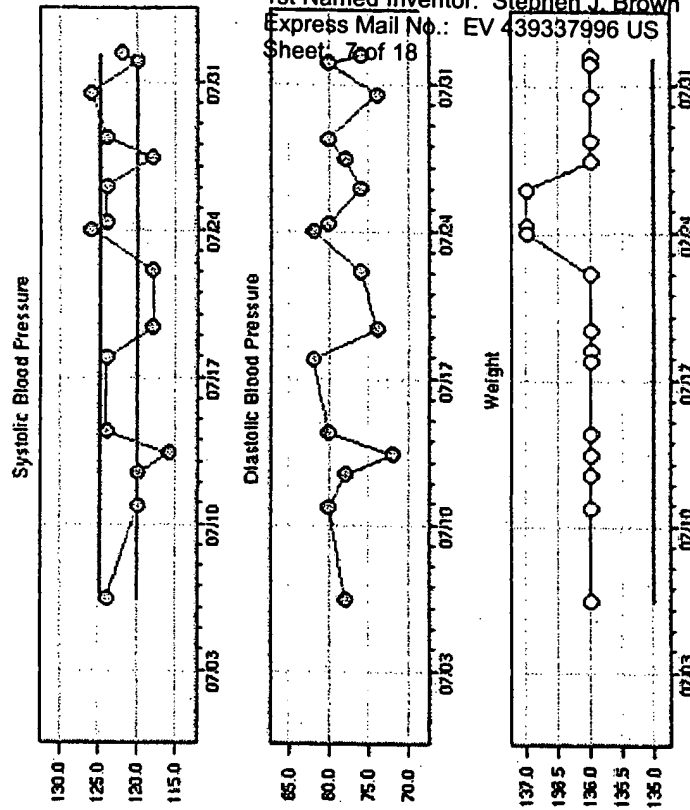



Blakely, Sokoloff, Taylor & Zafman LLP
 Title: Method and System For Integrating Feedback Loops in Medical Knowledge Development and Healthcare Management
 1st Named Inventor: Stephen J. Brown

(408) 947-8200
 Docket No.: 6858P056

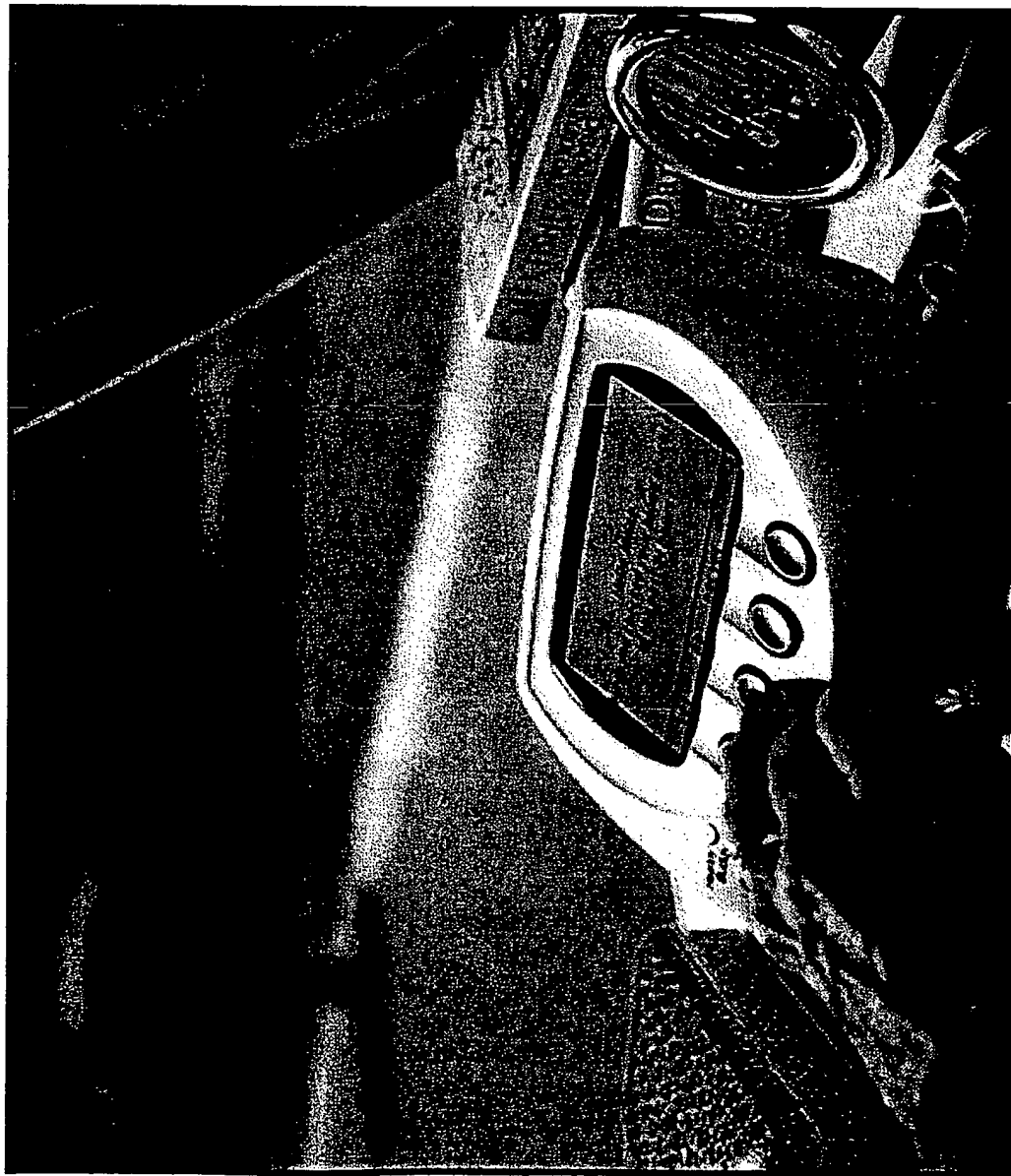
Patent No.: EV 439337996 US

Vision: Intelligent, Simple, Web-based, Integrated with Existing Clinical Information Systems and Care Processes



Daily Dialogue with the Patient

Vision: Intelligent, Interactive, Personalized, Simple,
Integrated with Consumer and Medical Devices



Hello Mary.
What is your weight today?

Less More

OK



Reminder: A weight gain may be a sign of fluid retention. Be sure to take your medicines and call Dr. Jones if your weight goes up more than 3 pounds.

OK



Daily Health Quiz: What is the best way to avoid feeling thirsty?

1. Drink water constantly
2. Save your fluids for mealtime and when you are feeling very thirsty
3. Eat more salt

1 2 3

Patient Dialogue Content

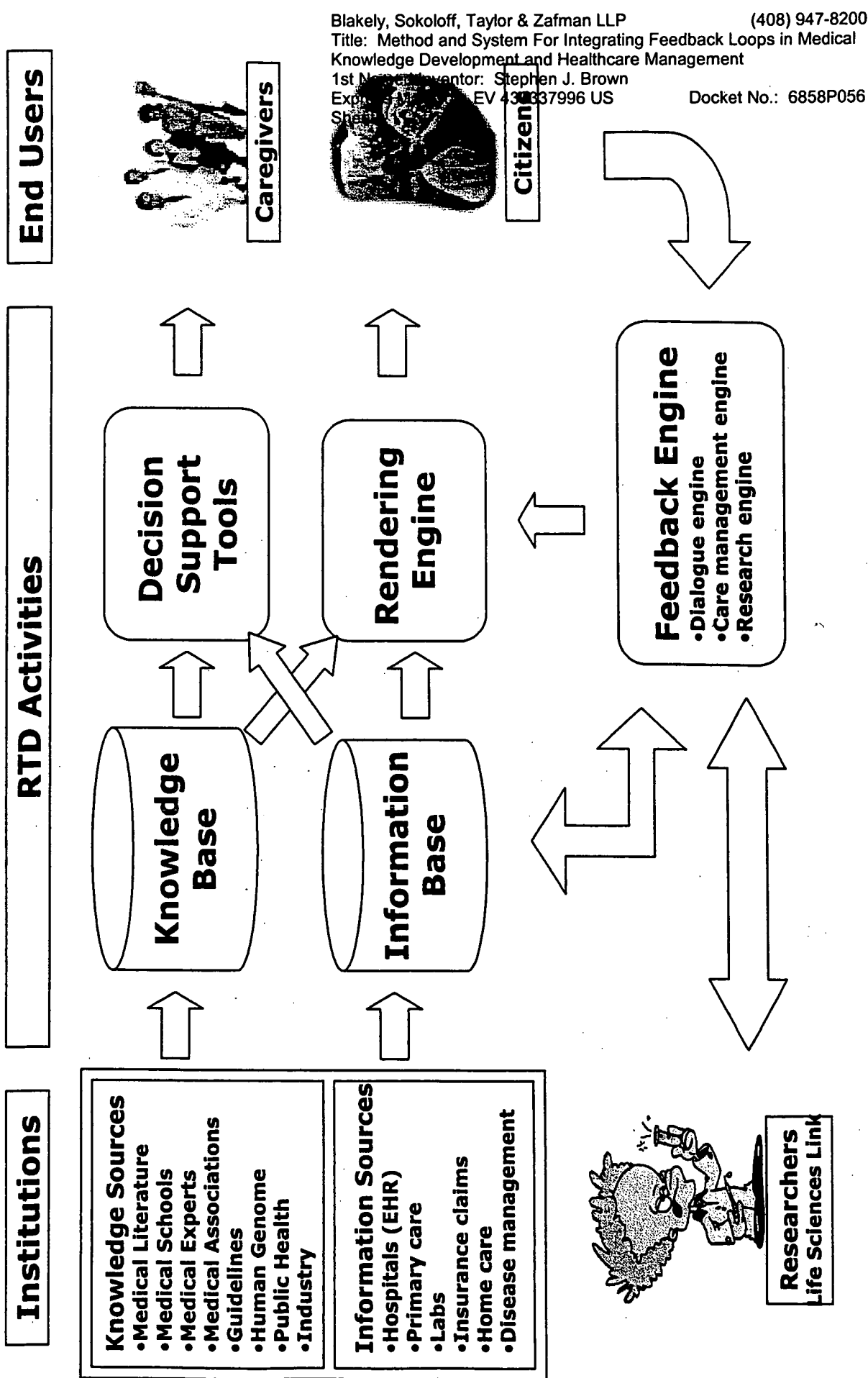
Vision: Based on Latest Medical Knowledge, Individualized, Generating Real-time Information

Demo Library / Demonstration day dialogues	Health Hero NETWORK
CHF Day, 0101	<p>Legend: <input type="radio"/> = No Risk <input type="radio"/> = Low Risk <input type="radio"/> = Medium Risk <input type="radio"/> = High Risk</p> <p><input type="checkbox"/> Welcome back, Pat! Thank you for using the Health Buddy. Begin whenever you are ready. (Greeting 2: None / General)</p> <p><input type="checkbox"/> Did you weigh yourself today? (Did you weigh today?: Weight / Behavior)</p> <p><input type="radio"/> Yes</p> <p><input type="checkbox"/> What is your weight today? (Use the arrows to indicate your weight) (Weight trend: Weight / Symptoms)</p> <p><input type="checkbox"/> (Q[Weight trend] > (M[HighWeight] + 2))</p> <p><input type="radio"/> True</p> <p><input type="checkbox"/> This is much higher than your usual weight. Sometimes weight can be affected by heavy clothing or shoes. Please be sure that you weighed yourself without heavy clothing or shoes. (Much Higher: Weight / Symptoms)</p> <p><input type="radio"/> Okay</p> <p><input type="checkbox"/> Remember, if your weight is up 3 or more pounds, call Dr. Welby today at 555-1212. (Reminder: Weight / Symptoms)</p> <p><input type="radio"/> False</p> <p><input type="checkbox"/> (Q[Weight trend] = (M[HighWeight] + 2))</p> <p><input type="radio"/> True</p> <p><input type="checkbox"/> This is somewhat higher than your usual weight. Sometimes weight can be affected by heavy clothing and shoes. Please be sure that you weighed yourself without heavy clothing or shoes. (Somewhat higher: Weight / Symptoms)</p> <p><input type="radio"/> Okay</p> <p><input type="radio"/> False</p> <p><input type="checkbox"/> (Q[Weight trend] = (M[HighWeight] + 1))</p> <p><input type="radio"/> True</p> <p><input type="checkbox"/> This is slightly higher than your usual weight. Sometimes weight can be affected by heavy clothing and shoes. Please be sure that you weighed yourself without heavy clothing or shoes. (Slightly higher: Weight / Symptoms)</p> <p><input type="radio"/> Okay</p>
COPD Day	<p>Health Hero NETWORK</p> <p>for you! You may start at any COPD, so that you can take the disease process / Knowledge) s and symptoms: Disease process 3 days? (More S & S: None / report this to your doctor today. our doctor's instructions. ng your doctor's instructions. tructions to keep up your health. ction are fever, coughing up eath. (Lung Infection: Pulmonary / more shortness of breath than Acknowledge: Pulmonary / or having more shortness of a infection. (Instruct: Pulmonary /</p>
Diabetes Day	<p>Health Hero NETWORK</p> <p>you may start at any time. Blood sugar trend question: Nothing to eat for 8 hours or ons] Blood sugar? (Please use the par). (BS Value trend: Blood sugar od sugar under 70 is considered remember to eat a sugar source ar is low, take your medicine, als and snacks as by your doctor. (Response: Blood / Symptoms] od sugar between 70-130 is e a healthy level. (Response: titoring / Symptoms] od sugar between 131-239 is dered to be moderately high. ke your insulin or diabetes pills your doctor. (Response: Blood / Symptoms] ur doctor if you continue to have ar levels for 3-4 days. (Response, ar monitoring / Symptoms] r over 240 is generally e too high. Remember to take</p>

Health Hero Network Contribution to MedKnowledgeMent

- 1.1 Information and Knowledge Sources and Formats
- 1.2 Information Acquisition → Information Base
- 1.3 Knowledge Acquisition → Knowledge Base
- 1.4 Information and Knowledge Processing → DSTs to identify gaps between Information Base and Knowledge Base (i.e. gaps between what is and what should be)
- 1.5 Information and Knowledge Rendering → Rendering Engine is the interface to end users
- 1.6 Information and Knowledge Acquisition → The Feedback Loops

Project Overview



Information and Knowledge Acquisition

→ The Feedback Loops

- Patient Dialogue Engine: Individualized Communication
 - Generated using Information and Knowledge Base
 - Interface with Rendering Engine
 - Feedback to Information Base
- Care Management Engine: Just-in-time Care
 - Generated using Information and Knowledge Base
 - Feedback to DSTs
- Research Engine: Real-time Research
 - Interface to Information Base [extract existing data]
 - Interface to Dialogue Engine [when new data is required]
 - Feedback to Knowledge Base [new discoveries]

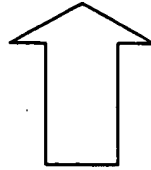
Health Hero Network

Contribution to Innovations

Current Status

Patient Dialogue Engine

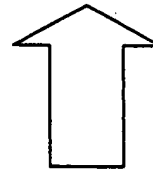
- Pre-packaged, mass customized programs
- Content libraries
- Health Buddy



- Automated individualization
- Content generated by knowledge base rules applied to information base
- Interface to Rendering Engine for any device

Care Management Engine

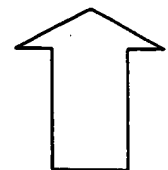
- Risk stratification
- Organizational workflow and efficiency tools
- Manual feedback process



- Intelligent risk tuning and link to DSTs
- Organizational optimization
- Automated feedback loop

Research Engine

- Data Export to SAS

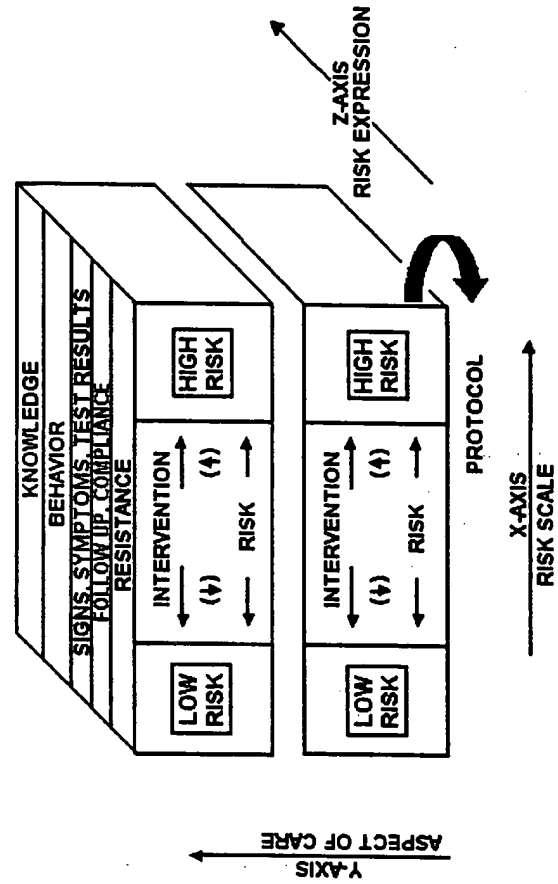


- Identify subgroups and correlations
- Test hypotheses on living database

New Innovations

Integrating Feedback Loops Within MedKnowledgeMent

- Application Program Interfaces
- Standards for Data Classification
- Ontology for Information and Knowledge Used in Feedback Process

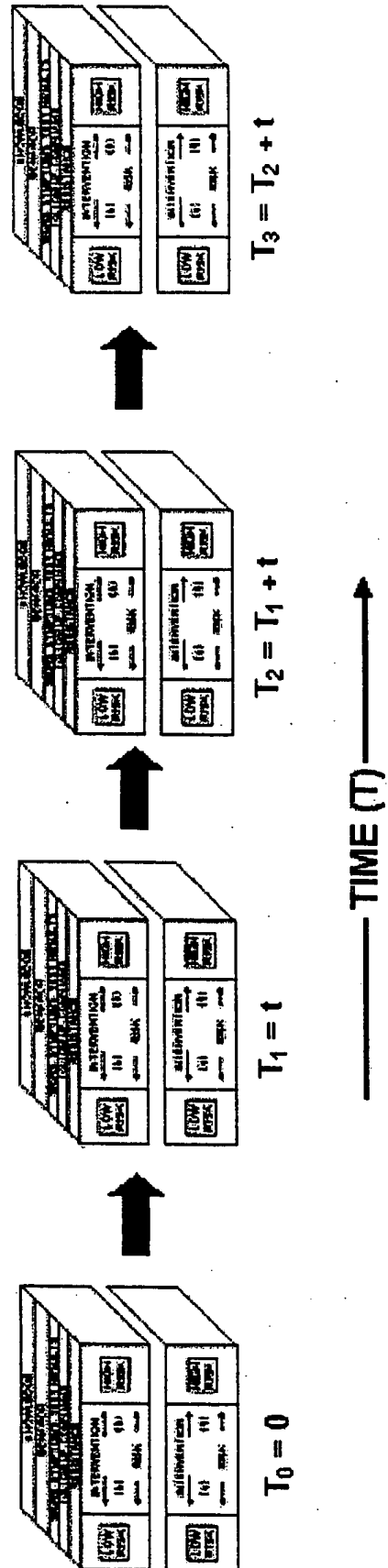


A 3-DIMENSIONAL MODEL OF DISEASE

Feedback Process

Overall goal is apply and generate medical knowledge in a continuous process that leads to lowest achievable risk resulting in:

- Higher quality of life
- Improved clinical outcomes
- Lower cost of care



Patient Trials

- Application to Major Diseases with Great Cost to Society
- Multi-center Demonstration Project
 - Health care and research centers in Europe
 - Large enough for meaningful result
 - Small enough to fit budget
- Standardized Protocol for Data Collection
- Outcomes Analysis
 - Aggregate data analysis for global impact
 - Site specific data analysis by country, disease, and care model
 - Key measures include: acceptability, satisfaction, utilization, clinical impact, medication compliance, quality of life, cost of care
- Medical Review Board
 - Review and approve all site specific study designs

Expected Results

- Reduced emergency department encounters and hospitalizations by detecting patient problems before they become a crisis.
- Improved patient compliance by educating, motivating and monitoring health status and by providing personalized and relevant information.
- Improved safety and quality of care by providing timely and actionable information to healthcare professionals through quality assured processes that can be continuously improved.
- Continuity of care, particularly for the elderly, through integrated, interconnected monitoring and information systems, rather than fragmented, episodic, and crisis driven care.

Expected benefit to the EU

Health is a key IST application for all citizens

- Stimulation of investment in information society technologies to modernize healthcare and enable sustained quality and access.
- Creation of an open platform for the application and generation of Medical Knowledge is an opportunity for European leadership at the convergence of information technologies, medical and consumer devices, and networks.
- Clinical applications that can be deployed as new service offerings over existing and new network infrastructures including broadband and wireless networks will stimulate the growth and success of those networks.
- The emerging eHealth sector will become vital to every region in the world that will experience the demands of an aging population and the resulting need for advanced and sustainable models of care.